Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL QUALITY MEASURES CLEARINGHOUSE

General

Title

End stage renal disease (ESRD): risk-adjusted standardized mortality ratio for dialysis facility patients.

Source(s)

Standardized mortality ratio (SMR) measure information form. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 6 p.

Measure Domain

Primary Measure Domain

Clinical Quality Measures: Outcome

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure is used to assess the risk-adjusted standardized mortality ratio (SMR) for dialysis facility patients.

The SMR is a ratio of the number of deaths among eligible patients at the facility during the reporting period to the number of deaths that would be expected among eligible patients at the facility during the reporting period, given the patient mix at the facility.

Rationale

Epidemiological
At the end of 2007 there were 527,283 patients being dialyzed of which 111,000 were new (incident) end stage renal disease (ESRD) patients (U.S. Renal Data System [USRDS], 2009). In 2009, the ESRD mortality rate was nearly 7 times the Medicare population (USRDS, 2009). ESRD mortality in the United States (U.S.) was 33% higher than in Europe (Goodkin et al., 2004), so this outcome is important to patients. The components of unexplained or unexpected mortality that are actionable and associated with

treatment and overall management of ESRD and other conditions are important to identify.

Financial
Patient health care for ESRD patients carries high costs associated with mortality. Inefficient and inappropriate management of all aspects of patient ESRD care carries a high costs for both providers and payers. In 2007, total Medicare costs for the ESRD program were $24 billion (a 6% increase from 2006) (USRDS, 2009).

Policy
This measure has been in use in the Dialysis Facility Reports (formerly Unit-Specific Reports) since 1995 and on the Dialysis Facility Compare (DFC) Web site since 2001, when the Balanced Budget Act (1997) required a system to measure and report the quality of dialysis services under Medicare.

The Dialysis Facility Reports are used by the dialysis facilities and ESRD Networks for quality improvement, and by ESRD state surveyors for monitoring and surveillance. The standardized mortality ratio (SMR) in particular is used by ESRD state surveyors in conjunction with other standard criteria for prioritizing and selecting facilities to survey. This patient survival classification measure is reported publicly on the DFC Web site to assist patients in selecting dialysis facilities.

Evidence for Rationale

Goodkin DA, Young EW, Kurokawa K, Prutz KG, Levin NW. Mortality among hemodialysis patients in Europe, Japan, and the United States: case-mix effects. Am J Kidney Dis. 2004 Nov;44(5 Suppl 2):16-21. PubMed

Standardized mortality ratio (SMR) measure information form. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 6 p.

U.S. Renal Data System. USRDS 2009 annual data report: atlas of chronic kidney disease and end-stage renal disease in the United States. Bethesda (MD): National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases; 2009.

Primary Health Components

End stage renal disease (ESRD); dialysis; standardized mortality ratio (SMR); death

Denominator Description

Number of deaths that would be expected among Medicare dialysis patients (adult and pediatric) at the facility during the reporting period, given the patient mix at the facility (see the related "Denominator Inclusions/Exclusions" field)

Numerator Description

Number of deaths among eligible patients at the facility during the reporting period (see the related "Numerator Inclusions/Exclusions" field)

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

Unspecified

Extent of Measure Testing

Reliability Testing

Data/Sample
Reliability of the standardized mortality ratio (SMR) was assessed using data on end stage renal disease (ESRD) patients over a four year period of 2006 to 2009. Data for the SMR are derived from an extensive national ESRD patient database, which is derived from Program Medical Management and Information System (PMMIS/REMIS), Medicare claims, the Standard Information Management System (SIMS) database maintained by the 18 ESRD Networks, the Centers for Medicare & Medicaid Services (CMS) Annual Facility Survey (CMS Form 2744), the CMS Medical Evidence Form (CMS Form 2728), the Death Notification Form (CMS Form 2746), and the Social Security Death Master File. The database is comprehensive for Medicare patients.

Analytic Methods
To assess reliability, CMS assessed the degree to which the SMR was consistent year to year. If one looks at two adjacent time intervals, one should expect that a reliable measure will exhibit correlation over these periods since large changes in patterns affecting the measure should not occur for most centers over shorter periods. Year to year variability in the SMR values was assessed across the years 2006, 2007, 2008 and 2009 based on the 5,280 dialysis centers for which an SMR is reported in the 2010 Dialysis Facility Reports (DFRs).

Testing Results
The correlation between SMR across adjacent years (2006 versus 2007, 2007 versus 2008, and 2008 versus 2009) ranged from 0.26 to 0.33, indicating that centers with large or small SMR tended to have larger or smaller SMR on the following year. These correlations were highly significant. Similarly, there was persistence in SMRs that were significant from year to year.

For example, there were 4.6% of facilities that had an SMR significantly greater than 1.0 in 2006 (18.3% did not have an SMR). Among those facilities, 30% were again significantly larger than 1.0 in 2007. Of the 3.1% of facilities that were significantly less than 1.0 in 2006, 18% were found to be significantly less than 1.0 in 2007. Among the 74% of facilities that had an SMR not significantly different from 1.0 in 2006, 87% remained in that category in 2007. The measure is based on complete data and is not subject to judgment or rater variability. Hence the measures of inter-rater variability are not relevant here.

Validity Testing

Data/Sample
Adjusted mortality and fractions of patients achieving the Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines for urea reduction ratios (URRs) (greater than or equal to 65%) and hematocrit levels (greater than or equal to 33%) were computed for 2,858 dialysis facilities from 1999 to 2002 using national data for patients with ESRD. Linear and Poisson regression were used to study the relationship between KDOQI compliance and mortality and between changes in compliance and changes in mortality.

Analytic Method
Measure validity is also demonstrated by the relationship of the SMR to other quality of care indicators, including hemoglobin greater than 10 g/dL, urea reduction ratio greater than or equal to 65%, percent of patients dialyzing with a fistula, and percent of patients dialyzing with a catheter.

Testing Results

In 2002, facilities in the lowest quintile of KDOQI compliance for URR and hematocrit guidelines had 22% and 14% greater mortality rates (P less than 0.0001) than facilities in the highest quintile, respectively. A 10-percentage point increase in fraction of patients with a URR of 65% or greater was associated with a 2.2% decrease in mortality (P = 0.0006), and a 10-percentage point increase in percentage of patients with a hematocrit of 33% or greater was associated with a 1.5% decrease in mortality (P = 0.003). Facilities in the highest tertiles of improvement for URR and hematocrit had a change in mortality rates that was 15% better than those observed for facilities in the lowest tertiles (P less than 0.0001).

Evidence for Extent of Measure Testing

Centers for Medicare & Medicaid Services (CMS). National Quality Forum (NQF) measure information: dialysis facility risk-adjusted standardized mortality ratio. Washington (DC): National Quality Forum (NQF). 2014 Oct 15. 10 p.

Wolfe RA, Hulbert-Shearon TE, Ashby VB, Mahadevan S, Port FK. Improvements in dialysis patient mortality are associated with improvements in urea reduction ratio and hematocrit, 1999 to 2002. Am J Kidney Dis. 2005 Jan;45(1):127-35. PubMed

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Ambulatory Procedure/Imaging Center

Hospital Outpatient

Managed Care Plans

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Single Health Care Delivery or Public Health Organizations

Statement of Acceptable Minimum Sample Size

Does not apply to this measure

Target Population Age

Unspecified

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Aim

Better Care

National Quality Strategy Priority

Prevention and Treatment of Leading Causes of Mortality

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Living with Illness

IOM Domain

Effectiveness

Data Collection for the Measure

Case Finding Period

The reporting period

Denominator Sampling Frame

Enrollees or beneficiaries

Denominator (Index) Event or Characteristic

Clinical Condition

Therapeutic Intervention

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions

Number of deaths that would be expected among Medicare dialysis patients (adult and pediatric) at the facility during the reporting period, given the patient mix at the facility

Note: The expected number of deaths for each facility is calculated from a 2-stage model. In the first stage, the predicted probability of death for each patient is calculated using a Cox model adjusting for patient's age, race, ethnicity, sex, cause of end stage renal disease (ESRD) (diabetes or other), duration of ESRD, nursing home status, comorbidities at incidence, body mass index (BMI) at incidence, calendar year and interaction terms between race, sex and duration and cause of ESRD. The second stage incorporates raceâ€specific state population death rate as a covariate.

Exclusions

- Patients on dialysis for less than 90 days
- Patients who have not been treated at the facility for at least 60 days
- Patient-months not within two months after a month with either: (a) $900+ of Medicare-paid dialysis claims OR (b) at least one Medicare-paid inpatient claim

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions

Number of deaths among eligible patients at the facility during the reporting period

Note: Information on death is obtained from several sources which include the Centers for Medicare & Medicaid Services (CMS) End Stage Renal Disease (ESRD) Program Medical Management Information System, the Death Notification Form (CMS Form 2746), and the Social Security Death Master File. The number of deaths that occurred among eligible dialysis patients during the time period is calculated.

Exclusions

This count does not include deaths from street drugs or accidents unrelated to treatment. Since these deaths are unlikely to have been due to treatment facility characteristics, they are excluded them from the calculations.

Numerator Search Strategy

Fixed time period or point in time

Data Source

Administrative clinical data

Registry data

Type of Health State

Death

Instruments Used and/or Associated with the Measure

Unspecified

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Ratio

Interpretation of Score

Desired value is a lower score

Allowance for Patient or Population Factors

not defined yet

Description of Allowance for Patient or Population Factors

Cox Model (Proportional Hazards Regression Model)

The standardized mortality ratio (SMR) calculation adjusts for patient age, sex, race, Hispanic ethnicity, diabetes as a cause of end stage renal disease (ESRD), nursing home status, duration of ESRD, body mass index (BMI) at incidence, and comorbidities at incidence, as well as state population death rates by comparing actual to expected deaths at the facility (indirect method of standardization). The number of expected deaths for patients at the facility is based on a Cox model accounting for these patient characteristics.

The SMR measure appears in the Dialysis Facility Report. Sections III and IV of the Guide to the Dialysis Facility Reports (1) and the document Technical Notes (2) on the Standardized Mortality Ratio contain information about the calculation of the SMR (including the risk adjustment methodology). Refer to the original measure documentation for additional information.

Standard of Comparison

not defined yet

Identifying Information

Original Title

Standardized mortality ratio (SMR).

Measure Collection Name

End Stage Renal Disease (ESRD) Quality Measures

Submitter

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

Developer

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

Funding Source(s)

Centers for Medicare & Medicaid Services (CMS)

Composition of the Group that Developed the Measure

Arbor Research Collaborative for Health, in collaboration with the University of Michigan Kidney and Epidemiology Cost Center (UM-KECC), develop, maintain, and update the End Stage Renal Disease (ESRD) Quality Measures for the Centers for Medicare & Medicaid Services (CMS), under the Quality Measure Development and Maintenance contract with CMS.

Financial Disclosures/Other Potential Conflicts of Interest

Arbor Research Collaborative for Health organizational disclosure information:

> The Dialysis Outcomes and Practice Patterns Study (DOPPS) is administered by Arbor Research Collaborative for Health and is supported by scientific research grants from Amgen (since 1996), Kyowa Hakko Kirin (since 1999, in Japan), Genzyme (since 2009), and Abbott (since 2009), without restrictions on publications. (Grants/research support)
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Arbor Research Collaborative for Health individual disclosure information:

> Ronald L. Pisoni, PhD, has received speaker fees from Amgen, Kyowa Hakko Kirin, and Vifor, has served as a consultant for Pursuit Vascular, and has served on an advisory panel for Merck.
> Friedrich K. Port, MD, has been a Scientific Advisor for the Nephrology Advisory Board.
> Sylvia Paz B. Ramirez, MD, has nothing additional to disclose.
> Bruce M. Robinson, MD, MSCE, has received speaker fees from Kyowa Hakko Kirin.
> Francesca Tentori, MD, has nothing additional to disclose.
> Robert A. Wolfe, PhD, has nothing additional to disclose.

University of Michigan's Kidney Epidemiology and Cost Center individual disclosure information:

> John Kalbfleisch, PhD, has nothing to disclose.
> J. M. Messana, MD, has nothing to disclose.

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Endorser

National Quality Forum - None

NQF Number

not defined yet

Date of Endorsement

2014 Sep 18

Measure Initiative(s)

Dialysis Facility Compare (DFC)

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2014 Jan

Measure Maintenance

Unspecified

Date of Next Anticipated Revision

Unspecified

Measure Status

Please note: This measure has been updated. The National Quality Measures Clearinghouse is working to update this summary.

Measure Availability

Source not available electronically.

For more information, contact Valarie Ashby at the Kidney Epidemiology and Cost Center, The University of Michigan, 1415 Washington Heights, Suite 3645 SPHI, Ann Arbor, MI 48109-2029; Phone: 734-763-

6611; Fax: 734-763-4004; Email: valarieb@med.umich.edu; Web site: Dialysis Data Web site .

Companion Documents

The following is available:

Centers for Medicare & Medicaid Services. National Quality Forum (NQF) measure information: dialysis facility risk-adjusted standardized mortality ratio. Washington (DC): National Quality Forum (NQF); 2014 Oct 15. 10 p.

NQMC Status

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Copyright Statement

Production

Source(s)

Standardized mortality ratio (SMR) measure information form. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 6 p.

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